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## *Abstract*

*The area was mapped in 1968 during a reconnaissance helicopter-supported field project. A crystalline complex containing rocks of Archean to late Archean to late Aphebian age underlies most of the map-area. Metamorphism within the complex is chiefly upper amphibolite to granulite facies. Structures are complex and outline a broad arcuate concave northward pattern. Folds are overturned predominately to the south-southwest.*

*About 11 500 feet of Neohelikian strata are preserved in the Milne Inlet Trough of the North Baffin Rift Zone. Dolomite and shales predominate, with a few gypsum beds occurring in the middle of the succession. A shallow-water shelf environment prevailed during deposition. Hadrynian diabase dykes intrude these strata and the crystalline rocks.*

*At least 3800 feet of Cretaceous shales, sandstones and mudstones are preserved in the Eclipse Trough and represent a thin molasse sequence deposited in a paralic environment in response to renewed faulting in the North Baffin Rift Zone.*

*The Neohelikian succession has attracted the interest of major exploration companies because Texasgulf Inc. has proven-up a large sphalerite-galena-silver deposit in Neohelikian strata about 100 miles to the west of the map area. Beds of subbituminous coal up to 5 feet thick occur mainly in the basal unit of the Cretaceous-Eocene sequence, and major oil companies have shown interest in the oil potential of these strata.*



## *Résumé*

*En 1968, se servant d'hélicoptère, on a cartographié la région à l'échelle de reconnaissance. Presque toute la région est recouverte par un complexe de roches cristallines allant de l'Archéen à l'Aphébien supérieur. Le métamorphisme du complexe va principalement de la partie supérieure du faciès amphibolite au faciès granulite. Les structures sont complexes et présentent en gros une forme concave arquée, orientée vers le nord. La plupart des plissements sont renversés vers le sud-sud-ouest.*

*Dans la dépression de l'inlet Milne dans le fossé nord de Baffin il y a environ 11 500 pieds de strates néohélikiennes composées surtout de dolomie et de schistes argileux avec quelques couches de gypse au milieu de la succession. La sédimentation a pris place sur une plateforme en eau peu profonde. Les dykes de diabase de l'Hadrynien ont envahi ces strates et les roches cristallines.*

*Dans la dépression d'Éclipse il y a au moins 3800 pieds de schistes argileux, de grès et de mudstones du Crétacé; ces roches représentent une succession peu épaisse de mollasse déposée en milieu paralique et due à des mouvements répétés le long de failles dans le fossé nord de Baffin.*

*La succession néohélikienne a attiré l'attention des grandes sociétés d'exploration, vu que la Texasgulf a délimité un gros gîte d'argent-galène-blende dans des strates néohélikiennes à environ cent milles à l'ouest de la région cartographiée. Des couches de charbon subbitumineux pouvant atteindre jusqu'à cinq pieds de puissance se rencontrent surtout dans l'unité de base de la succession du Crétacé-Éocène. Les principales sociétés pétrolières ont montré de l'intérêt pour les possibilités en pétrole de ces strates.*


Frontispiece. Looking westward toward Pond Inlet. Migmatized paragneisses occur west of Erik Harbour (foreground). Banded migmatite and granulite occur in left centre. Northwest-trending fault scarps (northeast side down) occur in upper left corner.

# GEOLOGY OF THE POND INLET MAP-AREA, BAFFIN ISLAND, DISTRICT OF FRANKLIN

## INTRODUCTION

The map-area (Fig. 1) is part of the region examined during Operation Bylot, a helicopter-supported reconnaissance project carried out in 1968 that included Bylot Island and that part of Baffin Island north of latitude 69° and east of longitude 80°. Major traverse lines are shown on Figure 1. Field-mapping was carried out by S. L. Blusson, A. Davidson, G.D. Jackson and W.C. Morgan of the Geological Survey of Canada, and by W.J. Crawford of Tacoma Community College. A. Davidson contributed a preliminary draft for Helikian and Cretaceous-Eocene stratigraphy and structure. Data obtained by W.L. Davison, who traversed by dog team in 1954 and by helicopter in 1963, were incorporated.

Consolidated rocks of the map-area were separated into 5 major units: Archean and Aphebian crystalline complex, late Aphebian granitic intrusions, Neohelikian (?) strata, Hadrynian diabase dykes, and Cretaceous to Eocene strata.

The authors acknowledge the extensive assistance received from W.F. Fahrig, and suggestions received from W.L. Davison, who critically read the manuscript.

## ARCHEAN AND APHEBIAN

Most of the map-area is underlain by highly deformed and metamorphosed crystalline Archean and Aphebian rocks (map-units mn to ck ). These are mainly granitic gneisses and migmatites which were cut by granitic to basic dykes and sills and a few small gabbro and quartz monzonite plutons prior to the last major metamorphism. Recognizable metasedimentary and metavolcanic rocks form bodies up to 30 miles in length that grade into migmatites. The dominant crystalline complex is cut by small plutons and dykes of massive granite to granodiorite (Ag) which are largely unmetamorphosed and which are thought to be late tectonic.

All of these rocks yield K-Ar mineral ages suggesting thermal effects of the Hudsonian Orogeny. However, many of the rocks of units gr and mn resemble rocks in the Icebound Lake map-area to the south which are considered to be of Archean age.

Two prominent aeromagnetic anomalies of 5,000 and 11,000 gammas above background occur in the south-central part of the map-area. Both are in ice-covered areas surrounded by crystalline rocks of the Archean-Aphebian complex (see Geol. Surv. Can. Aeromagnetic maps 4715G and 4716G).

### Nebulitic Gneiss ( mn )

This unit is largely light grey to light pinkish grey, nebulitic and foliated to weakly layered gneiss in which nebulae and schlieren commonly differ only slightly from the host rock. The rocks as a whole are mineralogically granodiorite to quartz monzonite. They are medium grained and slightly inequigranular. Minor amphibolite, hornblendite, and metasedimentary rocks are uncommon but locally comprise zones up to several hundred feet across. Pegmatite and aplite dykes of at least two ages intrude the nebulitic gneiss. A dome-shaped body composed largely of granular plagioclase (oligoclase) is present in an area composed largely of nebulitic gneiss 15 miles east of Paquet Bay.

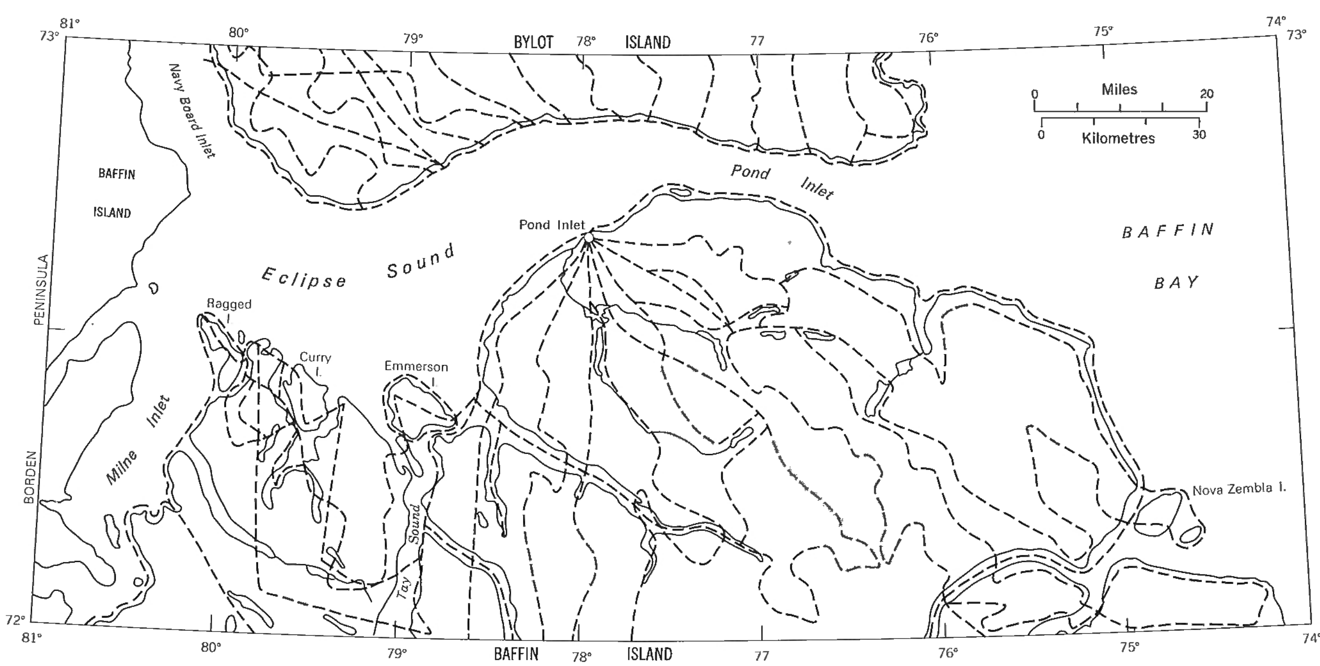


Figure 1. Approximate location of traverse lines.

Original manuscript submitted: November 13, 1973
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Figure 2.

Pond Inlet. Looking N.E. toward Bylot Island, July 21, 1968. Note airstrip east of the town. Mt. Herodier is on the far right. Photo by S.L. Blusson. GSC Photo No. 202620.

Figure 3.

Migmatized paragneiss on west side of "Utuk" Lake. Looking west, fold overturned northward, 72°32'N, 77°55'W. Photo by S.L. Blusson. GSC Photo No. 202615.

Similar rocks were observed in Icebound Lake, McBeth Fiord and Lake Gillian map-areas where field relations and radioisotopic dating suggest an Archean age. These rocks have been affected by Hudsonian and possibly by mid-Aphebian metamorphic events.

### Metasedimentary and Metavolcanic Rocks ( sv )

This unit occurs mainly in the northeast part of the map-area. There is generally clear correlation between these rocks and aeromagnetic highs and magnetic maps have been used extensively in defining the extent of the unit particularly the belt just south of Mount Herodier. Several positive anomalies between Emerson Island and the head of Oliver Sound may also be due to these rocks (see Geol. Surv. Can. Aeromagnetic map 8021G).

The metasediments and metavolcanics are chiefly light to dark grey and dark greenish grey; they are less commonly pinkish grey, mottled grey or black. They are very thinly to thickly banded and locally massive. The banding may reflect primary compositional differences. No other primary structures were observed, presumably because of metamorphism.

Biotite-quartz-feldspar gneiss is the most abundant rock type and most of the rocks of the unit are composed of varying proportions of quartz, biotite, hornblende, potash feldspar and plagioclase. Garnet and magnetite are commonly present; garnet is locally a major constituent. Sillimanite-bearing, hypersthene-bearing, and rusty-weathering gneisses were observed at several localities. Feldspathic quartzite occurs along the Patricia River (southeast of Eqeperiaqtalik Point). Ground moraine on central Ragged Island contains many boulders of metamorphosed iron-formation. Most of the gneisses are probably of sedimentary origin but some may have been derived from acid or intermediate volcanic rocks.

Much of unit sv is composed of amphibolite derived chiefly from basic volcanic rocks, but coarse-grained mottled varieties may originally have been gabbro. Common accessory minerals are garnet, chlorite, epidote and magnetite. Clinopyroxene and hypersthene occur in a few areas and Daniels (1956) has reported anthophyllite- and cummingtonite-amphibolites, and eclogites. Anorthositic layers and ultrabasic rocks occur at several places.

Rocks of this unit grade into migmatites ( mg ).

## Ultrabasic Rocks ( ub )

A small body of ultrabasic rock occurs south-southeast of Eqeperiaqtalik Point. It is a massive inequigranular blue-green rock composed chiefly of fine-grained serpentine; but it also contains large partially altered orthopyroxene crystals, and minor partially altered olivine along with chlorite and magnetite. A few other small ultrabasic bodies are also indicated on the map. Rare pods and lenses of metamorphosed ultrabasic rocks occur in the migmatites and gneisses but are too small to map separately. They are mainly hornblendite, pyroxenite and biotitite.

## Banded Migmatites ( mg )

These are distinctly banded rocks of highly variable composition. The bands range from a fraction of an inch to hundreds of feet in thickness. Commonly they are light grey (or white) to medium pinkish grey alternating with dark grey, black, or brown. The grain size is variable, but medium-grained material is most common.

The quartzofeldspathic component is mineralogically quartz monzonite to granodiorite, massive to foliated, sharply or gradationally bounded. The dark layers comprise amphibolite, paragneiss, and minor ultramafic. Many metamorphosed basic dykes and sills, and rare ultrabasic rocks were recognized within the unit. Rare anorthositic layers are also present.

The migmatites resulted from the injection of igneous material into metavolcanic and metasedimentary strata. Much of the banding is probably the result of anatectic melting and intense deformation. The unit also includes nebulitic, fluidal, boudinaged, augen, agmatitic and porphyroblastic phases.

## Foliated Granite to Granodiorite ( gr )

These are faintly foliated to banded pink to greyish pink granite to granodiorite, predominantly quartz monzonite but with rare syenite to monzonite. They are locally porphyroblastic and locally blastoporphyritic, faintly banded, migmatitic, and contain inclusions of various compositions. Metasedimentary bands, and amphibolite bands derived from volcanic rocks and from basic igneous intrusions are sparse within this unit.

Much of this unit is thought to have had an igneous intrusive origin. However, a large part may have been derived from the metamorphism of sedimentary and volcanic rocks. In Bylot Island map-area similar foliated granitic to granodioritic rocks grade into a charnockitic assemblage.

## Charnockite ( ck )

This unit is hypersthene granite to hypersthene granodiorite (charnockite to granoenderbite), chiefly monzocharnockite. It is fine- to coarse-grained, foliated or strongly lineated, is commonly sheared or crushed and is blastoporphyritic and blastomylonitic. Mottled to streaky greasy grey to green, light yellowish green, buff, and light brown are the most common colours. Sills and dykes of these rocks occur in minor

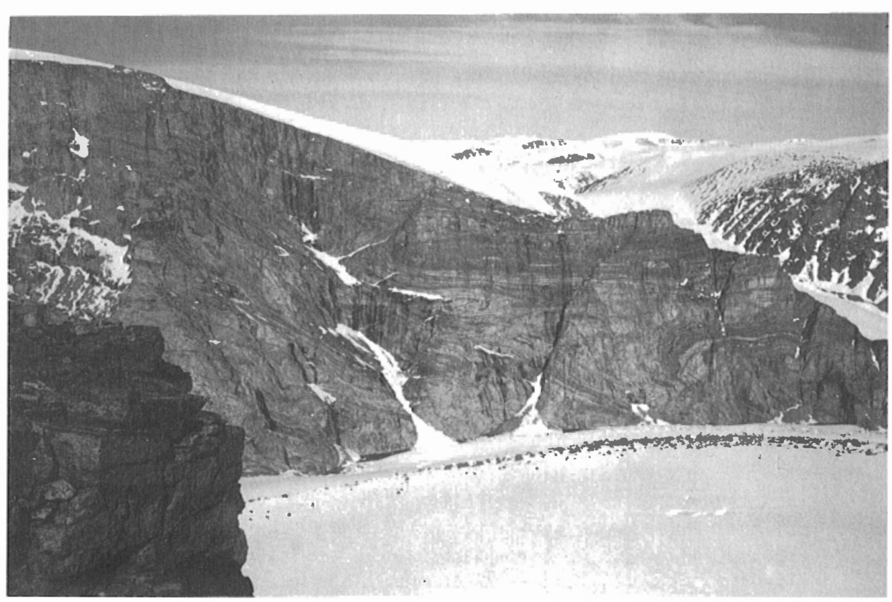

Figure 4.

Recumbent folds in banded migmatites. Looking north, 72°17'N, 76°43'W. Photo by W. C. Morgan. GSC Photo No. 202614.

TABLE OF FORMATIONS

| AGE | GROUP | FORMATION | MAP UNIT | LITHOLOGY |
|---|---|---|---|---|
| Eocene-Paleocene | Eclipse Group (3800±) | | T (400+) | Fissile shale, mudstone, siltstone |
| Upper Cretaceous to Eocene | | | $KT_2$ (1100±) | Arkosic sandstone, siltstone, rare coal |
| | | | $KT_1$ (1200±) | Subgreywacke, quartzwacke, mudstone, siltstone |
| Lower Cretaceous | | | K (1100±) | Orthoquartzite, arkosic sandstone, coal |
| | | ANGULAR UNCONFORMITY | | |
| Hadrynian | | Franklin Dykes | Hg | Tholeiitic diabase |
| | | INTRUSIVE CONTACT | | |
| Neohelikian? | Uluksan Group (11,100±) | Athole Point Formation (1800+) | NAP | Argillaceous limestone, calcareous shale, calcareous siltstone |
| | | LOCAL DISCONFORMITY ? | | |
| | | Victor Bay Formation (2800±) | NVB (2300±) (500±) | Upper Member – dolomite, edgewise breccia, conglomerate, biohermal dolomite Lower Member – edgewise conglomerate and breccia, dolomite, shale |
| | | DISCONFORMITY ? | | |
| | | Society Cliffs Formation (2000±) | NSC | Stromatolitic dolomite; minor varicoloured shale, siltstone, sandstone; gypsum |
| | | DISCONFORMITY ? | | |
| | | Arctic Bay Formation (4500±) – Upper Member (2200±) | NAB-U | Shale, dolomite, sandstone; minor stromatolitic dolomite |
| | | Arctic Bay Formation (4500±) – Lower Member (2300±) | NAB-L | Shale, siltstone; minor sandstone, dolomite |
| | Eqalulik Group (400++) | Adams Sound Formation (400++) | NAS | Quartz sandstone; minor conglomerate |
| | | ANGULAR UNCONFORMITY | | |
| Late Aphebian | | | Ag | Massive granite to granodiorite |
| | | INTRUSIVE CONTACT | | |
| Archean and Aphebian | | | ck | Monzocharnockite (hypersthene-quartz monzonite) |
| | | | gr | Foliated granite to granodiorite |
| | | | mg | Banded migmatite |
| | | | ub | Serpentinite, pyroxenite, hornblendite, biotite |
| | | | sv | Paragneiss, amphibolite; minor pyroxene gneiss, eclogite, quartzite |
| | | | mn | Granitoid nebulitic gneiss |

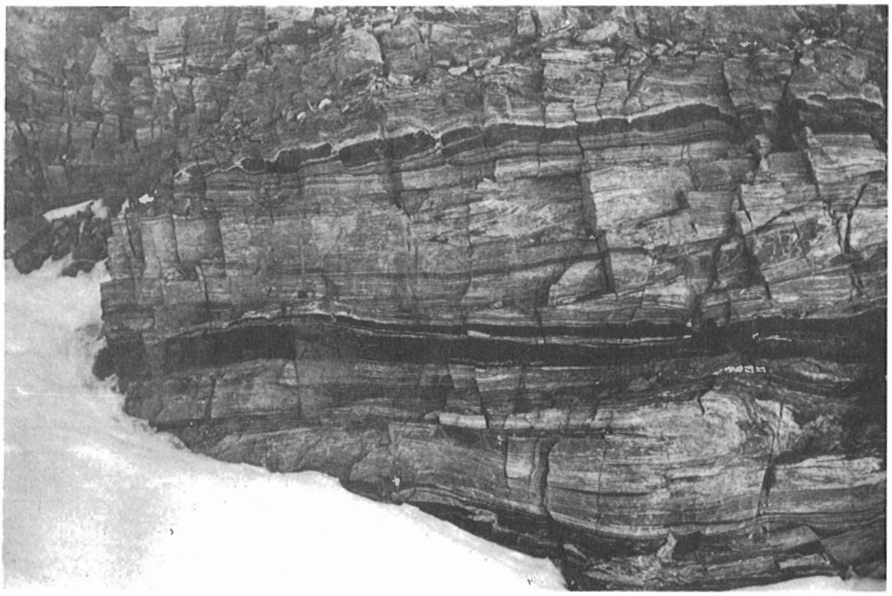

Figure 5.

Banded fluidal migmatites with boudinaged mafic bands and recumbent flow folds, $72^{\circ}26'$N, $76^{\circ}30'$W. Photo by S. L. Blusson. GSC Photo No. 202618.

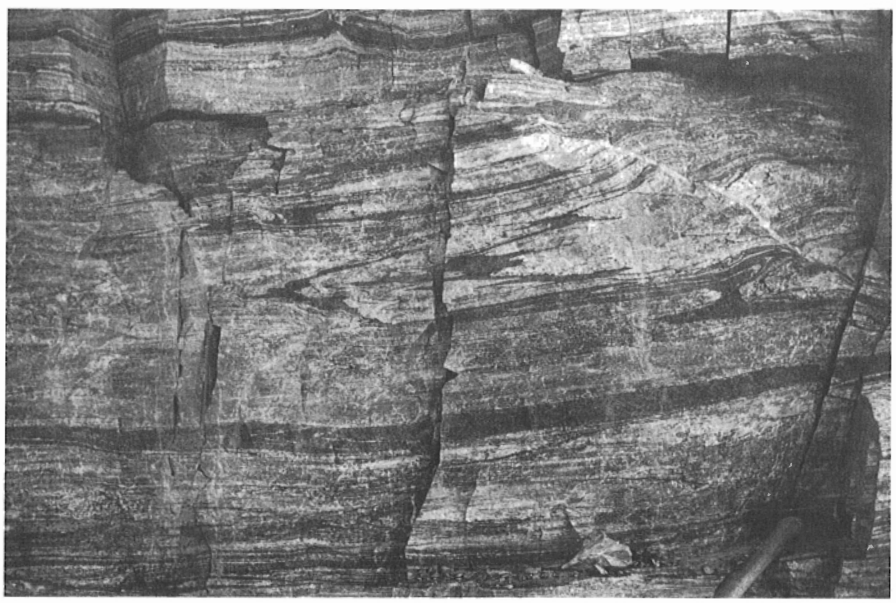

Figure 6.

Banded fluidal migmatite. Photo shows the central portion of Fig. 5. Photo by S. L. Blusson. GSC Photo No. 202619.

amounts in other map-units, chiefly in banded migmatite in areas where granulite-facies rocks predominate.

As in the Bylot Island map-area, these rocks are tentatively considered to have beem emplaced during an anorogenic event that is no younger than mid-Aphebian. Whether or not they originally contained hypersthene is a moot point. Much of the hypersthene now present was probably formed during the Hudsonian granulite metamorphism.

## LATE APHEBIAN

### Massive Granite to Granodiorite (Ag)

Massive granite to granodiorite, chiefly quartz monzonite, occurs as dykes and sills in all other map-units of the crystalline complex. A few bodies are large enough to show separately. They are rarely deformed, but locally have been metamorphosed and are thought to have been emplaced during a late stage of the Hudsonian Orogeny. They are probably correlative with larger massive granitic bodies in the Icebound Lake map-area to the south.

The dykes and sills range from discrete bodies forming less than one per cent of the outcrop, to anastomosing networks comprising as much as 80 per cent of the outcrop. They range from vertical to horizontal and in many places have a much shallower dip than the intruded gneisses. Typically these granitic rocks are massive, pale to medium pink, and fine- to coarse-grained. White varieties and foliated varieties occur locally. Pegmatites and aplites are rare in these rocks and are probably related intrusions.


Figure 7. Looking west from Tay Sound at Uluksan Group strata in Milne Inlet Trough. "Rainbow Cliffs", underlain mainly by Society Cliffs strata, are in the foreground. White Bay, Eskimo Inlet and Milne Inlet are in the background. Angmagraluit Mt. is underlain by Upper Arctic Bay and Society Cliffs strata.

## NEOHELIKIAN (?)

### EQALULIK AND ULUKSAN GROUPS

Rocks of probable Neohelikian age consisting of more than 11,000 feet of gently folded, unmetamorphosed sedimentary strata occupy the southwest part of the map-area. They are either in fault contact with, or rest unconformably on, older crystalline rocks. Northwesterly trending diabase dykes of the Franklin intrusions, approximately 700 m.y. old (Fahrig et al., 1971; Fahrig and Schwarz, 1973), cut all of the Neohelikian formations.

Blackadar (1956, 1968b, 1970) divided equivalent strata, to the west, into two groups, a lower (Eqalulik) containing two formations and an upper (Uluksan) containing seven formations. In Pond Inlet-Nova Zembla Island map-area the Eqalulik Group is represented by the Adams Sound Formation and the Uluksan Group by the Arctic Bay, Society Cliffs, Victor Bay and Athole Point formations.

The age of these rocks is not well established. A single K-Ar whole-rock determination on volcanic rock of the Nauyat Formation (Blackadar, 1970) in the basal part of the sequence in the region to the west, yielded an age of 903±140 m.y. As noted above, the entire sequence is cut by Franklin dykes which are thought to be about 700 m.y. old, but it is possible that these intrusions are significantly older. The sequence cut by these dykes may have a thickness of 19,000 feet (Geldsetzer, 1973) or 29,000 feet (Blackadar, 1970) and it contains several disconformities. Furthermore these rocks were folded and faulted prior to the intrusion of the Franklin dykes.

The intrusion of dykes at least 700 m.y. ago into a thick sequence that had been mildly deformed prior to the intrusion suggests that the Eqalulik and Uluksan groups are Helikian – probably Neohelikian – in age, that is, are more than 950 m.y. old, but post-date the Hudsonian Orogeny.

#### Adams Sound Formation (NAS)

The Adams Sound Formation was observed only on the east side of Tay Sound and along the White Bay Fault Zone west of Curry Island although strata of this unit may have been included with lower Arctic Bay strata in the extreme southwest part of the map-area. The strata are light grey, very fine to medium grained, thinly to thickly bedded, crossbedded, highly fractured quartz sandstones. Quartz-pebble conglomerate (sheared and slickensided) occurs west of Curry Island and some beds low in the section on the east side of Tay Sound are cherty shales with disseminated quartz grains.

At the Tay Sound locality about 400 feet of Adams Sound Formation are exposed but in adjacent areas much greater thicknesses have been recorded (for example, Blackadar, 1970).

#### Arctic Bay Formation (NAB-L and NAB-U)

The Arctic Bay Formation of the map-area has been divided into two members, a lower (NAB-L), and an upper (NAB-U). The lithologic differences that occasioned this division do not exist in the formation to the west of the map-area, where the Arctic Bay is more lithologically homogeneous throughout (Blackadar, 1968a-d, 1970). The lower member is chiefly fissile shale, mudstone, silty shale and siltstone. Fresh surfaces are mostly dark grey to black but a few beds are green or greenish grey. Weathered surfaces are rusty brown and commonly covered with fine white efflorescent gypsum or scattered gypsum crystals. Mudcracks, ripple-marks and crossbedding are abundant; concretionary and slump structures occur locally.

The proportion of sandstone, quartzite and dolomite within the lower member increases southeastward and comprises 10 per cent of the unit in the Tay Sound area. Sandstone and quartzite decrease, and dolomite increases, upward within the member. The sandstone forms zones up to 20 feet thick and the dolomite zones up to 10 feet. These are separated by shale units that are up to 380 feet thick but commonly are less than 150 feet. Sandstone and quartzite are white to light grey or tan, very fine- to fine-grained, thin- to thick-bedded, and locally crossbedded or intercalated with shale. A few thin grit and pebble-conglomerate beds are present. The dolomites are thinly laminated to thin bedded, medium to dark grey on fresh surfaces, and orange, brown or reddish brown on weathered surfaces.

The lower member grades abruptly into an upper member containing a significantly greater proportion of dolomite and sandstone. Except for this, the two members are lithologically similar but the dolomite of the upper member commonly weathers to a lighter shade and is thicker bedded and locally vuggy. Disseminated and nodular pyrite was observed in some of the shale and dolomite. The upper member consists of units 25 to 150 feet thick that may include one or more of the major rock types (shale, siltstone, dolomite, sandstone) in thin to thick interbeds. Sandstone and sandy beds are more abundant to the east and perhaps to the north as well. In some places the abundance of sandstone and shale decreases upward in the member.

Minor rock types of the upper member include limestone, green shale, gypsiferous shale, gritty to pebbly conglomerate, sandy dolomite, dolomitic sandstone, dolomite breccias, chert and cherty dolomite. Stromatolitic dolomite is present in the upper part. Mudcracks, ripple-marks and crossbedding are common; worm-like (fucoidal) markings are present locally.

The Arctic Bay thickens southeastward from its type area near Arctic Bay (Lemon and Blackadar, 1963; Blackadar, 1970) and may be as much as 4,000 feet thick in Pond Inlet-Nova Zembla map-area. A section of the lower member near the head of Tay Sound (just south of the map-area) consists of 1,475 feet of strata. This member probably has a maximum thickness of 2,000-2,500 feet in the map-area. A partial section of the upper Arctic Bay west of Tay Sound is about 1,000 feet

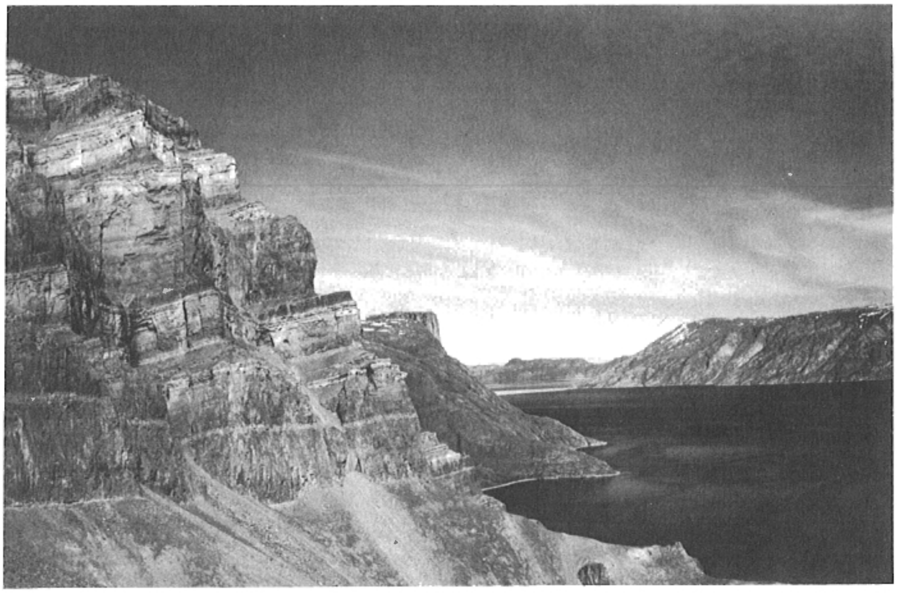

Figure 8.

Society Cliffs strata. Looking north at "Rainbow Cliffs" on west side of Tay Sound, 72°08'N, 79°02'W. Photo by W. J. Crawford. GSC Photo No. 202612.

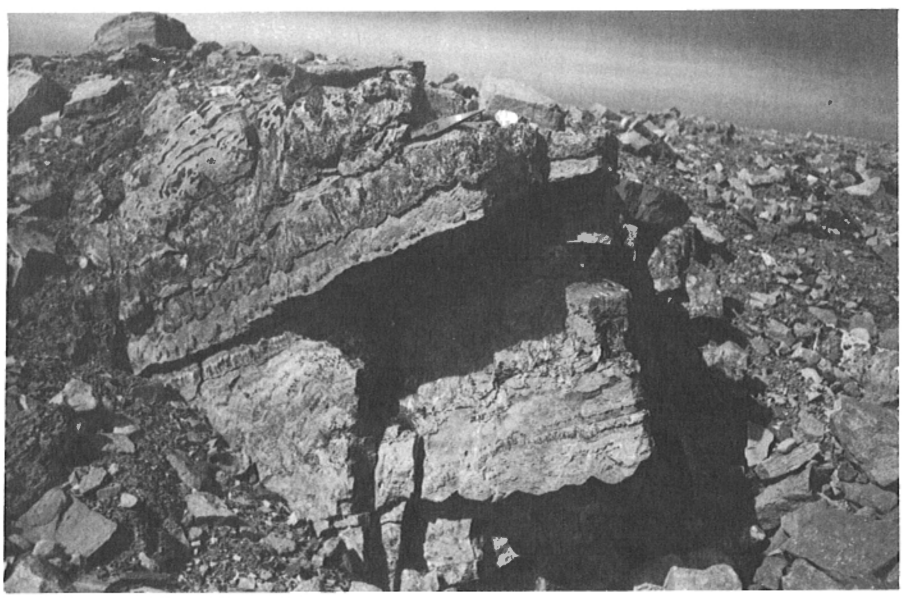

Figure 9.

Beds of small vertical columnar algal structures in upper Society Cliffs Formation in "Rainbow Cliffs" section, west side of Tay Sound. Photo by W. J. Crawford. GSC Photo No. 202613.

thick and a partial section east of White Bay, 1,225 feet thick. At the latter locality lower beds of the member are cut out along the White Bay Fault Zone. Ground observations combined with airphoto study suggest an average thickness for the upper member of 2,300 feet in complete section.

The Arctic Bay is gradational with the underlying Adams Sound Formation. This relationship can be well observed just south of the map-area in Icebound Lake map-area.

### Society Cliffs Formation (Nsc)

The Society Cliffs Formation outcrops within the map-area from east of Tay Sound west to Milne Inlet. It is predominantly thick bedded to massive, light to medium grey, cliff-forming dolomite interbedded with less resistant buff to light grey and mottled platy dolomite. Faint laminae, seen in some of the beds, may be of algal origin. The dolomite ranges from dense lithographic varieties to silty, and vuggy, medium-grained crystalline dolomite.

Interbedded red, green, and brown shale, siltstone, sandstone and minor dolomite appear cyclically throughout most of the Society Cliffs Formation within the map-area and extend westward to about the mouth of Eskimo Inlet. These are predominantly red zones that are restricted to the region east of Milne and Navy Board inlets (cf. Blackadar, 1968, a, b, c, 1970). They are well exposed in cliffs along the west side of Tay Sound just south of the White Bay Fault Zone. Here at least 8 lenses and zones have been identified. Most are 10 to 30 feet thick, but one zone in the middle of the formation is about 150 feet thick. Gypsiferous shale and beds of pure white gypsum as much as 5 feet thick occur in some of the red-bed units. Mudcracks, ripple-marks, current bedding, crossbedding, and load casts are common in most rock types.

Minor flat-pebble conglomerate and sandstone occur chiefly in the lower part, and stromatolites and minor chert beds, nodular chert, and chert and dolomite breccias, are more abundant toward the top of the formation. The stromatolites occur as: layers or mattes 1/50 to 1 inch ($\frac{1}{2}$-30 mm) thick; columnar aggregates 1 inch high in thinly bedded chert; concentric-layered chert tubes up to 2 inches long; columnar and ball-and-socket types 2 inches in diameter (length undetermined); bun-shaped (onion-skin) types up to 6 inches in diameter; and broad dome-shaped stromatolites (inverted saucer) in two size ranges, the smaller up to 8 inches in diameter and the larger up to about 5 feet in diameter. The breccias include sedimentary, solution, and fault breccias.

At its type locality the Society Cliffs Formation consists of about 900 feet of massive to vaguely bedded grey dolomite (Lemon and Blackadar, 1963; Blackadar, 1970). To the southeast, toward the present map-area, it becomes well-bedded and, locally, more argillaceous (cf. Blackadar, 1968, a, b, c, d). On the west side of Tay Sound this formation is about 2,000 feet thick. The Society Cliffs Formation and the underlying Arctic Bay Formation seem conformable (Blackadar, 1970); however, Geldsetzer (1970, 1973) has described two localities west of Tremblay Sound where the relationships are disconformable. Within the map-area closed-work, polymictic, pebble-conglomerate with red arkosic matrix occurs at or near the base of the Society Cliffs Formation between Paquet Bay and Tay Sound, and Olson (1970) has reported the presence of a 25-foot bed of brown sandstone at the base of the Society Cliffs Formation on the west side of Tay Sound. This sandstone contains reworked fragments of Arctic Bay shale and siltstone. The varicoloured nature of the clastics, and abrupt increase in the proportion of dolomite in the Society Cliffs Formation compared with the Arctic Bay further support the contention that a disconformity separates these two formations in the map-area.

### Victor Bay Formation (NVB)

The Victor Bay Formation is restricted to the area west of Tay Sound and is lithologically more variable than are the underlying Society Cliffs and overlying Athole Point formations. It is divisible (although this division is not shown on the accompanying map) into two members. The basal unit of the lower member consists of thinly bedded black shale, siltstone, and argillaceous limestone. This is overlain by repeated zones (up to 100 feet thick) of chiefly thinly bedded to massive dark grey argillaceous or calcareous dolomite, dolomite, edgewise conglomerate or breccia with clasts up to one foot long, and fine- to coarse-grained crossbedded and ripple-marked quartz sandstones. Either conglomerate-breccia, or sandstone may predominate locally. Beds of sandy dolomite, cherty dolomite, flat-pebble dolomite conglomerate, quartz-pebble and quartz-cobble conglomerate, and dark grey to black shale and siltstone are also present. This lower member has a variable thickness estimated to range from 350 to 500 feet.

These strata give way upward to light grey, buff to white-weathering, poorly bedded to massive dolomite, edgewise dolomite breccia and dolomite intraformational conglomerate. Chert nodules and stromatolites are present locally. This upper member thickens markedly towards the northwest to at least 2,300 feet on Ragged Island. A bioherm of columnar stromatolites forms the top of the Victor Bay on Ragged Island and a second occurs on the mainland west of Curry Island. That near Curry Island is 5,000 feet long and about 1,000 feet thick.

The Victor Bay seems conformable with the underlying Society Cliffs Formation but the abrupt increase in proportion of clastic material in the lower Victor Bay Formation suggests the presence of a disconformity (Blackadar, 1970).

### Athole Point Formation (NAP)

The Athole Point Formation occurs northwest of White Bay and is the uppermost formation of the Uluksan Group recognized in this map-area. It is chiefly dark grey to black, thinly laminated to thinly bedded argillaceous limestone, calcareous shale, and calcareous siltstone. Each of these three lithologies predominates in alternating zones 20 to 400 feet in thickness. Pure limestone and fine- to coarse-grained sandstone form a few zones (10 to 100 feet thick) within the Athole Point; the sandstone zones occur mainly in the lower part of the formation.

Minor graded greywackes, varvites, and chert beds are also present. Some of the chert beds contain columnar stromatolites about 1 inch in height. Crossbedding, mudcracks and cut-and-fill structures are present locally.

The Athole Point is apparently conformable with the underlying Victor Bay but on Ragged Island a disconformity may separate the two. There the basal unit is carbonate-cemented feldspathic quartz sandstone. About 1,800 feet of Athole Point is present on Ragged Island but the top of the formation was not observed. At the type locality, 10 miles to the west, this formation is reported to be at least 5,000 feet thick (Blackadar, 1965, p. 20).

## HADRYNIAN

### Franklin Dykes (Hg)

Northwest-trending diabase dykes of the Franklin intrusions (Fahrig et al., 1971) cut all other Precambrian rocks of the map-area and are particularly prominent where they cut Neohelikian strata. They are about 700 million years old and are typical tholeiitic diabase. They are up to several hundred feet thick and appear to post-date most of the deformation (and faulting) of the Neohelikian strata. There are few dykes with a more northerly trend that are probably not Franklin dykes but no data are yet available on their age.

## CRETACEOUS-EOCENE

### ECLIPSE GROUP ( K to T )

The Eclipse Group consists of about 3,800* feet of flat-lying to gently dipping strata that are predominantly orthoquartzite, arkosic sandstone, greywacke, siltstone and mudstone. Several coal beds and lenses occur in the lower part of the group. All of the units ( K to T ) contain dark carbonaceous beds, plant remains and chips of dark shale and coal. Palynological work by W. S. Hopkins, and D. C. McGregor (Jackson and Davidson, 1975) indicates a Lower Cretaceous to Eocene age (see Appendix IV).

#### Unit K

Unit K consists largely of weakly cemented white orthoquartzite with arkosic sandstone. Much of the sandstone is buff, orange, light brown, or dark reddish brown. It is thin- to thick-bedded and very fine grained to gritty and pebbly. Minor interbedded grey to greenish grey shale and siltstone, rare crossbedded pebble-conglomerate, black shale, carbonaceous sandstone, and red hematite-rich shale with yellow sandstone pipes 1 cm across, are also present. Locally they contain mudcracks, ripple marks, crinoid casts, and pyritiferous sandstone concretions. Seams and lenses of black coal up to 5 feet thick are most abundant in the Salmon River area, where at least 6 seams occur. The sandstone of the unit is locally concretionary and crossbedded and may contain scattered, powdery, amber nodules. Most exposures are so weakly consolidated as to be essentially sand. This may be due to weathering.

The thickness of this formation is rather variable and is estimated to range from 100 to 1,100 feet (30 m to 270 m). The succession appears to thin southeastward on Bylot Island. This unit is probably Lower Cretaceous according to unpublished reports on some of the material by W. S. Hopkins.

#### Unit KT1

Unit KT1 is composed chiefly of uniformly interbedded subgreywacke, quartz wacke, mudstone, and siltstone. Colours range from buff, brown and grey to olive green and khaki; single colours predominate in zones 150 to 300 feet thick. The strata are very thin- to thin-bedded, and calcite commonly cements the grains together. The sandstones (subgreywackes and quartz wackes) are poorly sorted and contain angular grains of quartz and feldspar with smaller amounts of hypersthene, augite, hornblende, garnet, magnetite, and rock fragments, in a finer grained argillaceous matrix. Carbonaceous plant fragments are common on bedding surfaces; mudcracks, crossbedding and red hematite staining occur but are uncommon.

This unit probably ranges from 900 to 1,200 feet in thickness (270 m to 370 m). It appears to overlie K conformably and thins southeastward on Bylot Island. Palynological work suggests a Paleocene to Eocene age for KT1 (W. S. Hopkins, unpubl. rept.). However, fewer samples from KT1 than from either K or KT2 were studied.

#### Unit KT2

This unit is chiefly friable cream, buff, olive green, khaki, dirty grey and light brown arkosic sandstone. It is poorly sorted, commonly calcite-cemented, and very thin- to thick-bedded. It contains minor black fissile shale, khaki-coloured shale, siltstone, claystone, and greywacke. Much of the siltstone is carbonaceous and locally contains concretions which are up to 5 feet in diameter. Plant remains are abundant locally. White orthoquartzite forms a very minor part of the unit and a few thin coal lenses are present. Crossbedding and ripple-marks are locally abundant.

The estimated thickness of the unit is 700 to 1,100 feet (210 m to 340 m) and it is conformable with underlying KT1. Palynological work by W. S. Hopkins was able only to assign the samples to Upper Cretaceous to Eocene.

#### Unit T

This unit consists predominantly of grey to black fissile shale and mudstone beds in which cone-in-cone structures are locally well developed. The cones point downward with the apex in a thin silty layer. These strata are interbedded with dark grey to greyish brown siltstone, muddy sandstone, and mudstone. Carbonaceous plant remains are locally abundant in the silty or sandy beds. The siltstones and sandstones are very thinly to thickly bedded. Ripple-marks are present locally in all rock types. Carbonate is present chiefly in the siltstone and mudstone.

The unit has an estimated maximum thickness of 400 feet (120 m) in the map-area. It is gradational with KT2, in the upper part of which the abundance of sand gradually decreases and shale becomes the dominant rock type. Palynological work indicates that this unit has an age which may range from Paleocene to Eocene.

## METAMORPHISM

Most of the metamorphosed rocks within the map-area are in the upper amphibolite facies of regional metamorphism. However, granulite facies rocks pre-

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*These strata were examined in 1973 by B. Clarke (pers. comm.) of Shell Oil Ltd. He concluded that there is at least 6,000 feet of these strata represented, and that the section may thin westward. The presence of a considerable thickness of sedimentary rocks on southwestern Bylot Island is suggested by a negative gravity anomaly (Observatories Branch, 1969).

dominate in the gneisses north of Eclipse Sound and occur in several areas from Tunuiaqtalik Point east to south of Eric Harbour.

Amphibolite facies rocks commonly contain plagioclase that ranges in composition from $An_{22}$ to $An_{43}$. Potash feldspar is commonly microcline and is locally perthitic. Biotite ranges in colour from greenish brown to brown and hornblende from light to dark bluish green and greenish brown. Sphene, magnetite, ilmenite, leucoxene, and apatite commonly occur as minor constituents. Minor amounts of zircon, pyrite, pyrrhotite, and chalcopyrite occur in several places. Garnet and clinopyroxene occur mainly in amphibolite which also contains cummingtonite and anthophyllite in some areas, and sillimanite occurs in some metasedimentary rocks. Muscovite, scapolite and allanite are relatively rare. Epidote, chlorite, and secondary biotite and hornblende occur as retrograde products.

The presence of hypersthene was the main criterion used to delineate the granulite facies areas. Most plagioclase ranges in composition from $An_{30-50}$ and is commonly antiperthitic. Most biotite is reddish brown but some is brown. Hornblende is greenish brown or olive green. Garnet, clinopyroxene, and accessory magnetite, ilmenite, pyrite, apatite and zircon are common. Traces of carbonate and chalcopyrite occur locally. Sillimanite occurs in some of the metasediments and corundum with minor hercynite occurs in metasediments about 8 miles east of the terminus of Narsarsuk Glacier on the south coast of Bylot Island. Epidote, chlorite, hornblende, and biotite occur as retrograde minerals. Reaction rims of hornblende around hypersthene and hornblende-pyroxene rims around garnet occur in a few places.

The boundaries of granulite facies rocks on Bylot Island seem to be more clearly defined than those on Baffin Island where the change from amphibolite into granulite facies rocks is more gradational. In addition, subordinate amphibolite facies assemblages are more common in the granulite facies terrain south of Eclipse Sound, and both facies appear to be represented in the same outcrop.

The granulite facies rocks are believed to have resulted from prograde metamorphism during the Hudsonian Orogeny. Amphibolite facies rocks become granoblastic and "greasy looking" towards the hypersthene isograd, feldspars become perthitic or antiperthitic, and sphene disappears. In addition, individual map-units of the crystalline complex may be traced from amphibolite into granulite facies terrain without a break. The late massive granitic bodies of unit Ag that occur in the granulite terrain appear to have been metamorphosed also, but rarely are they obviously deformed. Therefore, in granulite terrain some bodies of unit Ag may be difficult to distinguish from older bodies of unit ck .

Minor retrograde metamorphic effects are present in many of the granulite and amphibolite facies rocks and probably occurred in part during the waning stages of Hudsonian metamorphism.

## STRUCTURE

### Archean and/or Aphebian

A broad arcuate pattern, concave to the north, is outlined within the Archean and/or Aphebian crystalline complex by the foliations, distribution of lithologies, and the granulite facies isograds. This pattern is clearly the continuation of a huge arcuate structure that encompasses the crystalline complex of Bylot Island to the north (Jackson and Davidson, 1975). This arcuate structure becomes more poorly defined southward in Pond Inlet–Nova Zembla map-area.

Overturned to recumbent isoclinal folds are common. Most axial planes trend west-northwest and dip north-northeast. Where observed, most recumbent folds plunge northerly at a large angle to the general geneissic trends. Open antiformal and synformal flexures are also common, and are subhorizontal or plunge westerly. Along Oliver Sound it is particularly clear that these represent a slight warping of the overturned and recumbent folds.

The presence of refolded folds, tightly folded pegmatites, pegmatites intruding late massive quartz monzonite which in turn intrudes migmatite, and metamorphosed gabbro dykes and sills, all suggest that at least some of these crystalline rocks have undergone more than one major period of deformation and metamorphism.

Most of the faults throughout the map-area trend southeasterly and are probably post-Hudsonian. What seems to be a thrust plane dipping gently eastward occurs on Curry Island.

### North Baffin Rift Zone

Neohelikian, Paleozoic, and Cretaceous–Eocene strata of northern Baffin Island east of 86 degrees west longitude are preserved in a series of parallel, northwest-trending grabens separated by horsts of crystalline rocks (Fig. 2; Jackson and Davidson, 1975). These structures comprise the North Baffin Rift Zone. Most of the bounding faults dip steeply toward the grabens; for example, individual faults along the White Bay Fault Zone consistently dip about 60 degrees southwesterly.

Neohelikian strata of the Rift Zone were deposited in a fairly stable shelf or platform shallow-water environment in which subsidence kept pace with deposition. Regional upwarping or faulting interrupted deposition at least three times.

Adams Sound and lower Arctic Bay strata probably represent beach and intertidal to paludal deposits. A shallow carbonate platform evolved during deposition of upper Arctic Bay strata and is also represented by Society Cliffs, Victor Bay, and Athole Point formations. Abrupt changes in lithology are common in all of the strata above the Adams Sound Formation and most are probably related to fault movements which periodically raised or lowered the depositional and source areas. Thus the edgewise conglomerates, especially common in the Victor Bay Formation, probably reflect uplift of broad areas of deposition above wave base. Dolomite

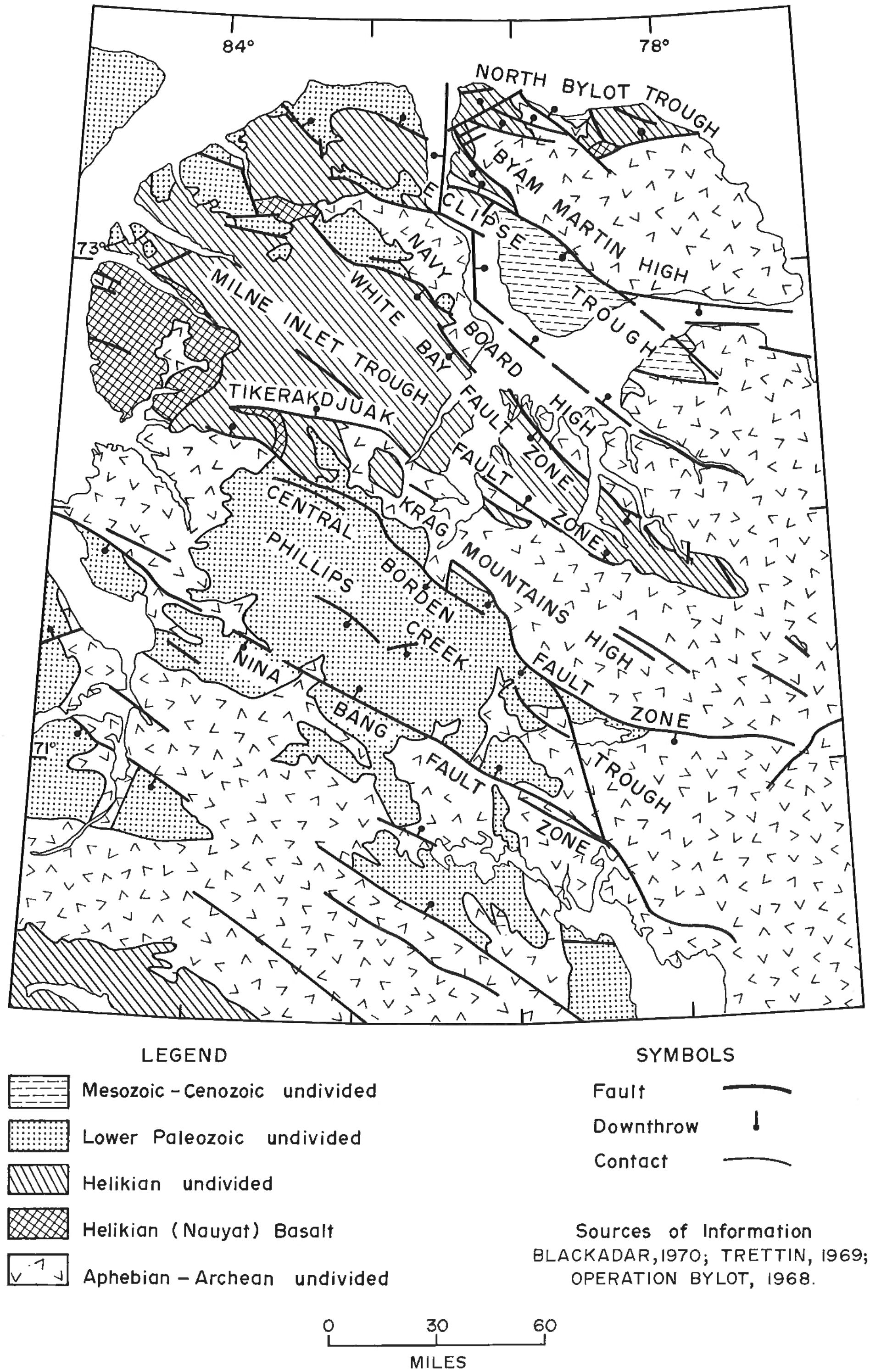


Figure 10. North Baffin rift zone, District of Franklin.

beds in the lower Arctic Bay Formation probably reflect subsidence of the depositional area.

Varicoloured shales and red mudstones with associated gypsum beds in the Society Cliffs Formation were probably deposited in an evaporitic tidal flat or a lagoonal environment. These strata are abundant in the Tay Sound area but die out westward and do not occur west of Milne Inlet (Blackadar, 1970; Geldsetzer, 1970). Similar strata occur in both the Society Cliffs and Victor Bay formations to the north (Jackson and Davidson, 1975) but are not known west of Navy Board Inlet.

Large bioherms are known to occur only in the Society Cliffs and Victor Bay formations in a region extending from west of Milne Inlet to White Bay (Geldsetzer, 1970). Their presence suggests that Milne Inlet-Navy Board Inlet may mark the location of a relatively important hinge line during sedimentation. Geldsetzer concluded that the source area prior to Society Cliffs time lay to the east and from Society Cliffs time on it lay to the west. He also considered the Athole Point Formation to be stratigraphically equivalent to the Strathcona Sound Formation.

The distribution and lithologies of the various formations and in particular, the distribution of red beds and large bioherms within the Society Cliffs and Victor Bay formations, suggest that the deepest part of the basin may have been in Milne Inlet area. Furthermore, strandlines probably lay to the east and west during deposition; and the trend of the eastern shoreline was probably about north-northwest. Faults trending northwest and north-south were active during deposition.

The Eclipse Group lies within the Eclipse Trough, and its basal unit, K , appears to be a sheet-like body of beach and shallow platform sands. Organic material, which gave rise to coal, was deposited in swampy depressions in the sands. Units KT1 to T may represent a thin molasse sequence deposited in a paralic environment in response to renewed faulting in the North Baffin Rift Zone. Unit T may have been deposited in a restricted or land-locked basin.

Open folding of the Neohelikian rocks and the slight warping of the Cretaceous-Eocene rocks about northwesterly trending axes is related to the block faulting. The greatest vertical displacement and deformation occurs along the northeast side of grabens. Within the map-area dips up to 65 degrees to the southwest occur in the Victor Bay Formation adjacent to the White Bay Fault Zone, whereas dips of up to 22 degrees southwest occur in the Eclipse Group along the northeast edge of the Eclipse Trough. Lower Paleozoic strata within the Phillips Creek Trough to the south of the map-area are deformed adjacent to the Central Borden Fault Zone. This deformation approaches that of the Neohelikian strata in the map-area.

The above observations support the conclusion that block faulting has occurred periodically in the North Baffin Rift Zone from before Neohelikian sedimentation until the present time. The fault blocks appear to have been tilted downward to the northeast during these movements and solution breccias within the upper Arctic Bay, Society Cliffs and Victor Bay formations are probably related to the block faulting.

## ECONOMIC GEOLOGY

Few indications of mineralization were seen in the Archean and/or Aphebian rocks of the map-area. Hematite float occurs in the vicinity of the southwest corner of Sermilik Glacier, and abundant iron-formation boulders occur in the ground moraine on Ragged Island. Neither rock type was found in place. Several rusty zones were seen from the air in metasedimentary and metavolcanic rocks of unit sv and are as yet unexplained. The reasons for the 5,000-gamma and 11,000-gamma aeromagnetic anomalies in the south-central part of the map-area are also not known.

Considerable interest has been shown in the economic potential of the Neohelikian strata of northwestern Baffin Island, and Texasgulf Inc. has examined thoroughly a large sphalerite-galena-silver deposit east of Arctic Bay. In recent years King Resources Limited has located several mineral occurrences within the Neohelikian strata of the Milne Inlet Trough which extends into the map-area (Fig. 2) (Trigg, Woollett and Associates Ltd., and Geowest Services Ltd., 1970; Olson, 1970; Geldsetzer, 1970). Most of these occurrences are of sphalerite and/or galena in the Society Cliffs Formation, but mineralization also occurs in the underlying Arctic Bay and overlying Victor Bay formations within the map-area. This mineralization seems to be related to brecciated zones, and chalcocite, chalcopyrite, marcasite and pyrite have also been reported. Purple fluorite occurs in fractures in the upper Victor Bay on Ragged Island. Spectrographic analyses of randomly selected Neohelikian samples carried out at the Geological Survey of Canada did not indicate any anomalously high values for lead and zinc.

Kirkham (1971) has suggested that stratiform copper deposits in sedimentary rocks are commonly found in sediments deposited in nearshore or marginal marine environments, where marine beds overlie continental red beds, and in sediments deposited at the beginning of marine transgression following a long period of continental sedimentation. Both the Arctic Bay and Society Cliffs formations contain sedimentary sequences deposited under these conditions. A semiquantitative spectrographic analysis of red gypsiferous shale from the Society Cliffs Formation west of Tay Sound yielded 0.15 per cent copper. This suggests that the red beds of the Society Cliffs and Victor Bay formations within the map-area and on Bylot Island (Jackson and Davidson, 1975) might be of economic interest.

Gypsum beds up to 5 feet thick, associated mainly with red mudstones, occur in at least two stratigraphic levels in the Society Cliffs Formation. A petroliferous odour was detected from a few of the Athole Point, upper Victor Bay, and Society Cliffs samples, and one Athole Point specimen indicated a faint trace of oil when examined with ultraviolet light.

Coal beds and lenses up to 6 feet thick occur in unit K of the Eclipse Group. The most extensive known deposits occur along the lower reaches of the Salmon River where at least 6 seams occur at one locality. Coal also occurs 15 miles southwest of Pond Inlet between Tunuiaqtalik and Eqeperiaqtalik points, and just west of the terminus of Sermilik Glacier. According to unpublished reports of the Geological Survey of Canada and of the Mines Branch, the coal seams are not known to be continuous for much more than 200 feet. The coal has a high fusain content, is of subbituminous rank, is non-coking, and can be made into briquettes.

A suite of samples from the Eclipse Group was submitted to Aquitaine Company of Canada Limited at their request, for hydrocarbon studies (Appendix III). They concluded that "Although abundant, the organic matter of the samples which have been studied shows little evidence of giving forth large quantities of liquid hydrocarbons because of its nature. An improvement might be looked for in more marine facies, where the most interesting part of the vegetal matter might have gathered (and eventually mixed with marine organic matter). Its degree of evolution is weak. This formation must, therefore, be buried much deeper if one hopes to find commercial quantities of hydrocarbons". (Artru et al., 1971).

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## APPENDIX I

Sections of Uluksan Group Strata

### Section A

(Modified from notes by S. L. Blusson)

Location: Coast west of Curry Island;
72°24'N, 79°44'W

Athole Point Formation

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| | Top of section | | |
| 7 | Sandstone; tan, buff weathering; poorly thick-bedded; calcite cemented; thin interbeds of dark grey to black limestone and, locally, of light grey weathering limestone | 45 | 445 |
| 6 | Limestone; black, argillaceous; commonly fissile; thin-laminated to thin-bedded; some light grey weathering thick sandy beds; and limestone beds to 1 ft. thick; locally cherty | 20 | 400 |
| 5 | Sandstone; buff weathering; thick-bedded to massive; contains clasts of buffish-orange weathering fine-grained dolomite ranging from a few inches to 2 ft. in diameter | 90 | 380 |
| 4 | Limestone; minor dolomite, sandstone, siltstone; dark grey; tan and dark grey weathered surfaces that in places alternate in well-ribboned sequences; thin-bedded; some beds to 1 ft. thick | 110 | 290 |
| 3 | Limestone; black fairly massive, crude parting | 5 | 180 |
| 2 | Limestone, dolomite; dark grey to black; upper few feet is fairly massive; grades downward into laminated and thin-bedded carbonates with intercalated dark grey weathering limestone and buff weathering dolomitic strata | 150 | 175 |
| 1 | Dolomite; dark grey to black; dark grey weathering; massive, cryptocrystalline; rough weathered surface | 25 | 25 |

Victor Bay Formation

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| 8 | Covered interval | 45 | 845 |
| 7 | Dolomite; light grey, light grey weathering; cherty; cryptocrystalline; massive | 185? | 800 |
| 6 | Dolomite; dark grey | 10 | 615 |
| 5 | Dolomite; light grey, light grey weathering; massive | 40 | 605 |
| 4 | Dolomite; medium to dark grey, thin-bedded | 25 | 570 |
| 3 | Dolomite; light grey, massive; minor black chert nodules locally; one dark band | 45 | 545 |
| 2 | Dolomite; dark grey; laminated to thin-bedded; well bedded | 20 | 500 |
| 1 | Dolomite; light grey; massive to well bedded; includes south end of large bioherm | 480? | 480 |

## Section B

(Modified from notes by W.J. Crawford;
and report by R.A. Olson, 1970)

Location: West side of Tay Sound;
"Rainbow Cliffs" section 72°08'N, 79°02'W

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| **Victor Bay Formation** | | | |
| 2 | Bedded to massive grey dolomite; weathers buff and grey | 65+ | 150+ |
| 1 | Black calcareous siltstone, mudstone | 85 | 85 |
| **Society Cliffs Formation** | | | |
| 43 | Poorly exposed; exposures are mainly very fine-grained medium to dark grey dolomite; thin-bedded to massive; vuggy in places, light weathering | 650± | 2,700 |
| 42 | Thick laminated, grey to brownish grey, very fine grained dolomite; weathers light to medium grey; some laminae of light grey to white lithographic dolomite, cherty dolomite and chert | 30 | 2,150 |
| 41 | Poorly exposed where observed; but well exposed in cliff where is interbedded light grey weathering dolomite with minor thin white and dark grey bands | 225± | 2,120 |
| 40 | Buff weathering dolomite; poorly exposed | 45 | 1,895 |
| 39 | Thick-laminated to thin-bedded and massive very fine grained dolomite; slightly vuggy; dark grey on fresh and weathered surfaces; poorly exposed | 90 | 1,850 |
| 38 | Laminated to thin-bedded, fine-grained, vuggy, silty dolomite; light dark grey on fresh and weathered surfaces; minor very dark and white bands; some of rock is vaguely mottled; $H_2S$ odour | 170 | 1,760 |
| 37 | Laminated to very thin-bedded, very fine grained, medium to dark grey dolomite and cherty dolomite; buff and grey weathering; beds of black chert contain vertical columnar stromatolites (Fig. 6) | 30 | 1,590 |
| 36 | Green, brown and red shale, siltstone and dolomite; ninth red-bed horizon | 15 | 1,560 |
| 35 | Fine-grained, light grey, massive, vuggy dolomite; weathers light grey and white; dark chert nodules | 20 | 1,545 |
| 34 | Laminated, fine-grained, silty, vuggy, medium to dark grey dolomite; weathered surface grades from dark grey in the lower part upward through light grey, to buff in the upper part; $H_2S$ and petroliferous odour | 80 | 1,525 |
| 33 | Laminated to thin-bedded, vuggy, light buff, very fine grained dolomite; weathers light grey and brown; proportion of interbedded green siltstone increases upward | 50 | 1,445 |
| 32 | Thin-bedded to massive, slightly vuggy lithographic dolomite; buff on fresh and weathered surfaces; becomes sandy in upper part | 30 | 1,395 |

Section B (cont'd)

Society Cliffs Formation

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| 31 | Laminated, very fine grained, vuggy buff to light grey dolomite; weathered surface grades from dark grey at bottom to light grey at top and to buff of the overlying unit ........ | 50 | 1, 365 |
| 30 | Thin-bedded very fine grained, buff dolomite; minor silt, disseminated quartz grains, and white orthoquartzite ........ | 10 | 1, 315 |
| 29 | Laminated, very fine grained dolomite; light grey on fresh and weathered surfaces, locally vuggy; $H_2S$ and petroliferous odour ........ | 65 | 1, 305 |
| 28 | Buff weathering dolomite ........ | 15 | 1, 240 |
| 27 | Laminated, very fine grained dolomite; medium grey on fresh and weathered surfaces, locally vuggy, $H_2S$ and petroliferous odour ........ | 60 | 1, 225 |
| 26 | Thick-laminated sandy mudstone, siltstone; some sericite; maroon with some brown, green; mudcracks; eighth red-bed horizon ........ | 20 | 1, 165 |
| 25 | Very thin bedded to massive, very fine grained, light grey dolomite; buff and grey weathering; chert nodules, and beds of black chert containing small vertical columnar stromatolites; large concentric stomatolites partially replaced by aphanitic bluish white quartz; locally vuggy, some vugs lined with calcite crystals; $H_2S$ odour ........ | 40 | 1, 145 |
| 24 | Thin-bedded, fine-grained dolomite; medium grey on fresh and weathered surfaces; locally vuggy, some vugs lined with fine white quartz crystals; stomatolites ........ | 40 | 1, 105 |
| 23 | Very thin bedded to massive, lithographic to fine-grained dolomite; medium grey to white on fresh and weathered surfaces; chert nodules; locally very vuggy; $H_2S$ and petroliferous odour ........ | 80 | 1, 065 |
| 22 | Faintly laminated to very thin bedded, fine-grained, medium to dark brownish grey dolomite; few laminae of coarser white dolomite ........ | 50 | 985 |
| 21 | Partly covered interval, contains some red-beds; seventh red-bed horizon ........ | 40 | 935 |
| 20 | Grey lithographic dolomite; weathers pale buff; few coarse white laminae ........ | 50 | 895 |
| 19 | Largely drift covered, contains some red-beds; sixth red-bed horizon ........ | 60 | 845 |
| 18 | Laminated to very thin bedded, lithographic to fine-grained dolomite; light to dark grey fresh and weathered surfaces, minor white; locally vuggy, some vugs contain dolomite crystals; local carbonate stringers; $H_2S$ and petroliferous odour in middle part; few silty and sandy beds in middle ........ | 150 | 785 |
| 17 | Thick-laminated fine-grained sandstone; buff on fresh and weathered surfaces; some cross laminations ........ | 10 | 635 |
| 16 | Red, brown and green siltstone, dolomite; fifth red-bed horizon ........ | 15 | 625 |

Section B (cont'd)

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| 15 | Thin-bedded to minor massive, fine-grained, light grey silty dolomite; weathers medium grey; porous, $H_2S$ odour; inter bedded sandstone and minor conglomerate at top ................................ | 60 | 610 |
| 14 | Red, brown, and green siltstone; some is dolomitic; mudcracks, few cross-laminations; fourth red-bed horizon ................................ | 15 | 550 |
| 13 | Very thinly interbedded grey dolomitic siltstone and sandstone; weathers green and light brown ............................................ | 50 | 535 |
| 12 | Very thin bedded to massive, very fine grained, vuggy, grey silty to sandy dolomite; weathers grey and light brown; grades upward into overlying member ................................................ | 125 | 485 |
| 11 | Red shale, siltstone, third red-bed horizon.............................. | 5 | 360 |
| 10 | Laminated to very thin bedded, fine-grained, vuggy, silty dolomite; weathers grey and buff; minor greenish grey dolomite-cemented sandstone .................................................. | 50 | 355 |
| 9 | Green and pink fine-grained sandstone, arkose; red shale, minor green shale; dolomite cement; minor sericite; shale and dolomite content increases upward; second red-bed horizon ...................................... | 55 | 305 |
| 8 | Thin laminated silty to sandy grey dolomite and sandstone; grey to buff weathering ................................................ | 20 | 250 |
| 7 | Black, fissile shale ................................................ | 10 | 230 |
| 6 | Thin laminated to very thin bedded green, pink, red, grey, fine-grained to granular sandstone and arkose with some lithic fragments; red shale in part disrupted; minor sericite; first red-bed horizon .............. | 20 | 220 |
| 5 | Mainly buff weathering sandy dolomite ................................ | 55 | 200 |
| 4 | Mainly grey weathering sandy dolomite ................................ | 20 | 145 |
| 3 | Mainly buff weathering sandy dolomite ................................ | 60 | 125 |
| 2 | Laminated, vuggy, silty grey dolomite; minor intraformational breccia; dark grey and dark brown on weathered surface ...................... | 35 | 65 |
| 1 | Brown, green, and rusty shale and sandstone; possibly some red-beds; ripple marks, mudcracks, crossbedding, reworked shale and sand at base; dark weathering ........................................ | 30 | 30 |
| | <u>Arctic Bay Formation - Upper Member</u> | | |
| 33 | Very thin bedded light grey lithographic dolomite weathers light buff ...... | 20 | 1,120 |
| 32 | Interbedded grey, brown weathering dolomite and black shale; laminated .................................................. | 40 | 1,100 |
| 31 | Dark grey, black to white weathering micaceous shale..................... | 80 | 1,060 |
| 30 | Thin-bedded, fine-grained, grey silty dolomite; mudcracks and minor flat-pebble conglomerate ........................................ | 10 | 980 |

Section B (cont'd)

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| 29 | Light grey weathering rock, probably shale and dolomite; poorly exposed ... | 30 | 970 |
| 28 | Laminated to thin-bedded grey shale and sandstone, weathers grey, brown, green; poorly sorted, angular fragments, mudcracks ................ | 50 | 940 |
| 27 | Covered interval ................................................ | 15 | 890 |
| 26 | Thin-laminated to thin-bedded, very fine grained, light grey, brown to buff weathering, dolomite vugs locally .............................. | 20 | 875 |
| 25 | Black shale, weathers dark grey ....................................... | 15 | 855 |
| 24 | Buff weathering dolomite .............................................. | 30 | 840 |
| 23 | Black shale ........................................................ | 5 | 810 |
| 22 | Laminated to very thin bedded; very fine grained silty grey dolomite, limestone; minor breccia, sericite; weathers brown to dark grey ...... | 35 | 805 |
| 21 | Thin-bedded, medium to coarse-grained, grey sandstone; weathers dark grey, dark brown; pyrite locally.............................. | 20 | 770 |
| 20 | Very thin bedded to massive, very fine grained, grey, vuggy dolomite, limestone; some intraformational breccia; weathers brownish-orange to red; fucoidal markings, mudcracks .............................. | 30 | 750 |
| 19 | Black shale ......................................................... | 10 | 720 |
| 18 | Buff weathering dolomite ............................................. | 35 | 710 |
| 17 | Black to green shale interbedded with thin- to medium-bedded coarse-grained grey sandstone; weathered surface is dark grey, green, brown; graded bedding; mudcracks throughout...................... | 130 | 675 |
| 16 | Laminated to thin-bedded very fine grained dark grey silty dolomite; weathers brown, grey; mudcracks ................................ | 40 | 545 |
| 15 | Black to grey-green laminated shale, siltstone; fine-grained sandstone; locally dolomitic; sericite .......................................... | 30 | 505 |
| 14 | Grey, medium-grained, vuggy dolomite ................................ | 10 | 475 |
| 13 | Thin- to medium-interbedded dark grey very fine grained dolomite, dark grey to green shale, minor sandstone containing muscovite; weathers grey, green, brown to buff ........................................ | 45 | 465 |
| 12 | Very thin bedded to massive, fine-grained, grey, vuggy dolomite ......... | 25 | 420 |
| 11 | Black silty dolomite; mudcracks; locally pyritiferous in upper part......... | 50 | 395 |
| 10 | Interbedded black and green shale, and dark grey and brown sandstone; mudstone breccia; graded bedding; minor sericite, pyrite ............ | 85 | 345 |
| 9 | Thin- to medium-bedded grit, shale; brown and grey; mudcracks ......... | 10 | 260 |
| 8 | Laminated to medium-bedded, dark grey, silty, very fine grained dolomite, minor limestone; weathers grey; mudcracks .......................... | 60 | 250 |

Section B (cont'd)

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| 7 | Medium to thin-bedded, grey sandy shale; mudcracks, ripple-marks | 80 | 190 |
| 6 | Medium-bedded black shaly limestone | 10 | 110 |
| 5 | Medium to thin-bedded grey, black, sandy shale, calcareous siltstone | 20 | 100 |
| 4 | Thin-bedded shaly and silty grit; graded bedding; mud fragments in base | 5 | 80 |
| 3 | Thin-laminated black shale, grey to black calcareous siltstone and fine-grained sandstone; weathers dark grey and black; green shale at top | 65 | 75 |
| 2 | Thin-bedded grey grit; graded bedding, mudcracks | 5 | 10 |
| 1 | Recessive green shale; fissile | 5 | 5 |

Shore of Tay Sound

## Section C

(Modified from notes by S.L. Blusson, G.D. Jackson; thicknesses estimated from outcrop widths and strike and dip measurements)

Location: North side of Milne Inlet Trough (Fig. 2), between Tay Sound and White Bay; 72°13'N, 79°15'W.

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| **Victor Bay Formation** | | | |
| | Section continues | | |
| 1 | Dark grey to black siltstone, limestone | ? | ? |
| | Contact area drift covered | | |
| **Society Cliffs Formation** | | | |
| 2 | Interbedded buff and light grey weathering dolomites with minor darker shaly and silty intervals | 1,600 | 2,150 |
| 1 | Mainly laminated to thin-bedded, fine-grained grey dolomite; weathers dark grey to buff, minor shale, siltstone | 550 | 550 |
| **Arctic Bay Formation - Upper Member** | | | |
| 24 | Poorly exposed dolomitic and shaly rocks | 103 | 2,050 |
| 23 | Thin-bedded grey dolomite; weathers buff; resistant to weathering | 16 | 1,947 |
| 22 | Rubble of laminated to thin-bedded, silty to sandy grey dolomite; rough, orange weathered surface | 13 | 1,931 |

Section C (cont'd)

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| 21 | Dark grey laminated to thin-bedded dolomite; minor interbedded shale, siltstone, sandstone; poorly exposed | 141 | 1,918 |
| 20 | Irregularly laminated to thin-bedded dolomite, silty to sandy dolomite, black shale, dolomite-cemented siltstone and sandstone; rough orange-brown to brown weathered surface | 221 | 1,777 |
| 19 | Poorly exposed dolomites, shales, siltstones | 79 | 1,556 |
| 18 | Rubble of very fine grained, dark grey, massive, vuggy dolomite; weathers dark brownish grey | 74 | 1,477 |
| 17 | Mostly a distinctive feldspathic granule conglomerate; carbonate cemented, weathers greenish grey; minor dolomite, shale, siltstone | 60 | 1,403 |
| 16 | Laminated to very thin bedded, calcareous and dolomitic brown sandstone; minor shale, dolomite | 56 | 1,343 |
| 15 | Poorly exposed dolomite, shale, siltstone; minor sandstone | 179 | 1,287 |
| 14 | Very thin bedded, orange-brown weathering dolomite | 8 | 1,108 |
| 13 | Thin-bedded, fine-grained, resistant, carbonate-cemented dark grey sandstone; weathers buff to medium brown | 8 | 1,100 |
| 12 | Poorly exposed dolomite, black shale, siltstone, sandstone | 167 | 1,092 |
| 11 | Light grey quartzite rubble | 10 | 925 |
| 10 | Poorly exposed dolomite, siltstone, sandstone, minor black shale | 183 | 915 |
| 9 | Brown sandstone | 8 | 732 |
| 8 | Interbedded green argillaceous sandstone and shale | 3 | 724 |
| 7 | Poorly exposed dolomite, shale, siltstone, sandstone | 96 | 721 |
| 6 | Light grey quartzite | 20 | 625 |
| 5 | Poorly exposed; several members of very thin to thin-bedded orange-weathering dolomite; minor shale, siltstone | 185 | 605 |
| 4 | Light grey weathering quartzite | 10 | 420 |
| 3 | Very fine grained, shattered limestone; weathers light bluish grey; beds up to several feet thick | 110 | 410 |
| 2 | Poorly exposed; upper part is predominantly laminated to thick-bedded grey to dark grey dolomite, limestone; weathers grey to brown and orange; minor siltstone, very fine grained sandstone, and dolomite with disseminated quartz grains; a few granule conglomerate beds to one foot thick; siltstone increases in abundance downward and predominates in lower part | 200 | 300 |
| 1 | Covered interval masking fault zone | 100 | 100 |

Archean - Aphebian basement

Regularly banded meso-granitic migmatite, pervaded by abundant massive pink granite and pegmatite.

## APPENDIX II

Sections of Uluksan Group Strata, selected and summarized from King Resources Co. data

### Section 3

Location: Northeast side Eskimo Inlet; $72^{o}13'N$, $79^{o}57'W$

Society Cliffs Formation

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| 22-30 | Laminated to thin-bedded light to dark grey dolomite, grey to brown weathering; locally is calcareous, vuggy, and stained white; 5-foot stromatolitic zone in central part; includes 3 covered intervals 20-30 ft. thick | 303 | 1,204 |
| 21 | Covered interval | 30 | 901 |
| 19-20 | Dark grey siltstone; minor dolomite; green shale at top | 30 | 871 |
| 16-18 | Laminated medium-crystalline, light to medium grey dolomite; weathers grey to brown; white stain in lower part | 217 | 841 |
| 14-15 | Interbedded green shale and grey, brown-weathering sandstone; 5 feet of red siltstone in upper part; 5 feet of dolomite at base | 100 | 624 |
| 13 | Green gypsiferous shale | 57 | 524 |
| 11-12 | Laminated light to medium grey dolomite, finely crystalline | 60 | 467 |
| 10 | Interbedded green shale and grey dolomite, minor iron stain | 90 | 407 |
| 7- 9 | Laminated to thin-bedded medium grey dolomite; lower half contains stromatolite mats | 51 | 317 |
| 6 | Covered interval | 116 | 266 |
| 5 | Laminated medium grey dolomite; some beds contain broken stromatolite mats | 70 | 150 |
| 4 | Covered interval, dolomite in talus | 70 | 80 |
| 3 | Medium grained sandstone | 10 | 10 |

Arctic Bay Formation - Upper Member

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| 1- 2 | Dark grey to black gypsiferous shale; minor green shale and dolomite at base | 83 | 83 |

## Section 4

Location: North end Angmagraluit Mt.,
$72^{\circ}17'N$, $80^{\circ}13'W$

Society Cliffs Formation

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| 1- 5 | Fine- to medium-crystalline, light to medium grey dolomite; several stromatolitic and cherty horizons that increase in abundance upward; local breccia; $H_2S$ and petroliferous odour | 1,055 | 1,055 |

## Section 5

Location: South end Ragged Island;
$72^{\circ}25'N$, $79^{\circ}58'W$

Athole Point Formation

| | | | |
|---|---|---|---|
| 14-15 | Interlaminated black siltstone, limestone, and calcareous siltstone; probable stromatolite bed at 45 feet | 180 | 1,680 |
| 13 | Dark grey limestone, white stain | 43 | 1,500 |
| 12 | Medium- to coarse-grained sandstone; well sorted, medium grey | 37 | 1,457 |
| 11 | Thinly interbedded black calcareous siltstone, sandstone, limestone; crossbedding | 400 | 1,420 |
| 10 | Covered interval | 50 | 1,020 |
| 9 | Dark grey crossbedded medium- to coarse-grained sandstone | 30 | 970 |
| 8 | Covered interval; sandstone grit and silty limestone in talus | 100 | 940 |
| 6- 7 | Thin-laminated to thin-bedded, dark grey silty limestone and limestone | 150 | 840 |
| 3- 5 | Laminated dark grey calcareous siltstone, sandstone, limestone | 70 | 690 |
| 2 | Covered interval; sandstone, limestone in talus | 300 | 620 |
| 1 | Dark grey crossbedded calcareous siltstone, sandstone, limestone; pebbly | 40 | 320 |
| | Estimated distance to base of formation | 280 | 280 |

## Section 7

Location: West side White Bay;
$72^{\circ}17'N$, $79^{\circ}43'W$

Victor Bay Formation

| | | | |
|---|---|---|---|
| 37-40 | Grey limestone and dolomite edgewise conglomerate; some shaly rocks in middle | 40 | 310 |
| 34-36 | Thin-laminated dark grey to black calcareous shale | 55 | 270 |

Section 7 (cont'd)

| Unit | Lithology | Thickness (feet) | Height above base (feet) |
|---|---|---|---|
| 31-33 | Massive to very thin bedded dark grey limestone, edgewise conglomerate... | 140 | 215 |
| 30 | Interbedded black shale, siltstone limestone | 75 | 75 |
| Society Cliffs Formation | | | |
| 15-29 | Thin-laminated to massive medium to dark grey dolomite; porous locally; stromatolite-and dark chert-bearing horizons throughout; a few breccia horizons; chert up to 50 per cent of rock | 316 | 628 |
| 13-14 | Grey dolomite, edgewise conglomerate | 20 | 312 |
| 8-12 | Laminated to thin-bedded grey dolomite; several stromatolite horizons, dark chert in middle of unit; stylolitic near tops | 139 | 292 |
| 7 | Covered interval | 53 | 153 |
| 5- 6 | Laminated to massive grey dolomite, stromatolites and chert beds in middle | 23 | 100 |
| 4 | Covered interval | 42 | 77 |
| 1- 3 | Vaguely bedded light to medium grey dolomite | 35 | 35 |

# APPENDIX III

Study by Aquitaine Co. of Canada Ltd., of organic content of Eclipse Group samples obtained from G. Jackson, G.S.C.
(see Artru *et al.*, 1971)
(The G.S.C. is grateful to Aquitaine for granting permission to publish these results.)

| Sample No. | JDC-87/1 | JDD-119/1 | JDD-199/2 | JDD-120a |
|---|---|---|---|---|
| Map Unit | KT2 | KT2 | KT2 | T |
| Location | 72°52'N, 78°36'W | 72°45'N, 79°19'W | 72°45'N, 79°19'W | 72°47'N, 79°32'W |
| Lithology | Grey sand, lignite | Dark grey silty sand | Grey sand, lignite | Brown argillaceous limestone |
| Total Organic Carbon,[1] % | - | - | 4.62 | 0.28 |
| Trace Elements in Mo | - | - | 2 | >100 |
| Clay Fraction, PPM, CU | - | - | 24 | > 80 |
| Soluble Organic Matter,[2] PPM | - | - | 370 | 70 |
| Soluble Organic Matter[3] / Total Organic Carbon | - | - | 0.80 | 2.50 |
| Hydrocarbon,[4] % | - | - | X | X |
| Aromatic[5] / Saturated | - | - | X | X |
| Carbon Ratio[6] | - | - | 0.86 | 0.80/0.81 |
| Preservation[7] | 2.75 | 3.00 (2.75) | 2.75 (3.00) | 3.25 |
| Light Absorption[8] | 29.2 | 21.5 | 17.6 (?) | X |
| Reflected Light[9] % | 0.37 | 0.44 | 0.37 | X |
| Classification[10] | II | III = A | II | X |
| Organic Content[10] | | | | |
| via Transmitted Light | Ligneous = P.<br>Cellular = P<br>Thin = P. | Sapropelic = F. | Cellular = F.<br>Ligneous = P. | X |
| via Reflected Light | Exinite = A<br>Fusinite and Semi-fusinite = R<br>Vitrinite = P | Fine Micrinite<br>Exinite = A<br>Inertinite and Vitrinite = R | Inertinite (Fusinite) and Vitrinite =A | X |

APPENDIX III (cont'd)

| Sample No. | JDD-120/b | JDD-121/1 | JDD-121/3 | *JDD-131/2 |
|---|---|---|---|---|
| Map Unit | KT2 | T | T | KT1 |
| Location | 72°47'N, 79°32'W | 72°52'N, 74°53'W | 72°52'N, 79°53'W | 73°09', 79°52'W |
| Lithology | Grey sand, lignite | Grey to brown argillaceous limestone | Lignite | Grey sand, lignite |
| Total Organic Carbon, [1] % | 7.40 | 0.85 | X | X |
| Trace Elements in Mo | 3 | 6 | X | X |
| Clay Fraction, PPM, CU | 30 | 4 | X | X |
| Soluble Organic Matter, [2] PPM | 390 | 100 | 1970 | 200 |
| Soluble Organic Matter [3] / Total Organic Carbon | 0.54 | 1.17 | X | 3.00 |
| Hydrocarbon, [4] % | 42.0 | X | 21.7 | X |
| Aromatic [5] / Saturated | 3.70 | X | 0.95 | X |
| Carbon Ration [6] | 0.88 | 0.82 | 0.86 | 0.75 |
| Preservation [7] | 3.00 | - | 2.50 (1.40?) | 3.00 |
| Light Absorption [8] | 26.2 | - | X | 25.2 |
| Reflected Light [9] % | 0.47 | - | 0.54 | 0.45 |
| Classification [10] | I=B, II=A | - | I=A | II |
| Organic Content [10] | | | | |
| via Transmitted Light | Ligneous = P.<br>Tracheios = P.<br>Cellular = P.<br>Thin = P. | - | Ligneous = A. | Ligneous = P.<br>Sapropelic = S.<br>Cellular = S. |
| via Reflected Light | Vitrinite and Fusinite = A<br>Spherolites = S<br>Oxydations = R | - | Vitrinite = A (95%) | Exinite and Vitrinite = A<br>Fusinite = R<br>Telinite = S |

APPENDIX III (cont'd)

| | | | |
|---|---|---|---|
| Sample No. | JDD-132 | JDB-177 | JD-212 |
| Map Unit | KT2 | K | K |
| Location | 72°55'N, 79°20'W | 72°37'N, 78°06'W | 72°37'N, 78°06'W |
| Lithology | Beige, grey sand, fine conglomerate, lignite | Dark grey silty sand, lignitic shale | Lignite |
| Total Organic Carbon,[1] % | - | 22.00 | X |
| Trace Elements in Mo | - | 4 | X |
| Clay Fraction, PPM, CU | - | 32 | X |
| Soluble Organic Matter,[2] PPM | - | 740 | 2670 |
| Soluble Organic Matter[3] / Total Organic Carbon | - | 0.30 | X |
| Hydrocarbon,[4] % | - | 23.0 | 23.0 |
| Aromatic[5] / Saturated | - | 1.56 | 3.48 |
| Carbon Ration[6] | - | 0.86 | 0.89 |
| Preservation[7] | 3.00 | 3.00 | 3.25 |
| Light Absorption[8] | 27.1 | 16.8 (?) | X |
| Reflected Light[9] % | 0.50 | 0.42 | 0.69 |
| Classification[10] % | I=B | II=B, III=A | I=B |
| Organic Content[10] | | | |
| via Transmitted Light | Ligneous = A. | Cellular = A.<br>Ligneous = P. | Tracheids = F. |
| via Reflected Light | Indeterminated<br>Inertinite = A<br>Exinite = B | Vitrinite and<br>Exinite = A<br>Inertinite = P | Fusinite = A (95%) |

APPENDIX III (cont'd.)

GENERAL COMMENTS:

1) The total organic content is above average.

2) The soluble organic content is extremely low, indicating immature organic matter with little potential. "The composition of the extracts confirms this impression."

3) Noticeable trace element concentrations were found in sample JDD-120a-68.

4) The boron content is normal in JDD-120a-68 (250 ppm) and corresponds to an open marine environment. In other samples the boron content indicates a fresh water environment subjected to marine influences (<150 ppm).

5) "Most of the samples ... are rich in ligneous vegetal elements of the Tracheid or Fusinite type." Some samples contain vegetal matter of tissue type, which normally is more favourable. Sample JDD-119/1-68 contains abundant sapropelic or colloidal matter which seems linked to fine micrinite, and ... "would appear to be the most favourable from a hydrocarbon formation point of view."

6) The high carbon ratios here appear to suggest a large predominance of detrital organic matter.

7) The maturation of the organic matter is, in general, weak to very weak. Most of the material can be classified as lignite, although the material in samples JD-212-68, JDD-121/3-68 is slightly more advanced.

8) The organic content shows little evidence of yielding large quantities of liquid hydrocarbons, although marine facies equivalents should be more favourable. The degree of evolution is weak.

NOTES

- : Sample not analyzed.

X : Analysis attempted, no result obtained.

1 : As per cent of total carbon content.

2 : Extracted using chloroform.

3 : Soluble organic matter divided by total organic carbon.

4 : As per cent of soluble organic matter.

5 : Aromatic hydrocarbon (e.g. $C_6H_{12}$) divided by saturated hydrocarbon.

6 : Volatile carbon divided by total organic carbon.

7 : 1.00 is best, 5.00 is least.

8 : Limits are 50A – OA (A = Microamperes)
50A – 20A: immature organic matter
Below 20A: mature organic matter

9 : $RPsp = \frac{RPst \times Isp}{Ist}$

RPsp = reflecting power of the sample;
RPst = reflecting power of the standard;
Isp = intensity of the light reflected by the sample;
Ist = intensity of the light reflected by the standard.

10 : Classification, Organic Content:

I – large predominance of "Ligneous" organic matter

II – mixed organic matter

III – large predominance of Sapropelic organic matter

A – Abundant

F – Frequent

P – Present

S – Some

R – Rare

* JDD-131/2 – is in Bylot Island map-area.

## APPENDIX IV

### IDENTIFICATION OF MICROFOSSILS FROM ECLIPSE GROUP

(Compiled from the following reports by W.S. Hopkins Jr.: K-2WSH-1969, K-6WSH-1969, K-20WSH-1972, T-02-WSH-1973)

#### Unit T

G.S.C. loc. 8444, field no. JDD-122-68, southwest Bylot Island; 72°58'N, 80°03'W; unit T.

Abundant inaperturate pollen grains, probably from the family(s) Taxodiaceae-Cupressaceae.

*Sporopollis* sp.

Age: indeterminate.

G.S.C. loc. C-22459, field no. JDD-121/2-68, southwest Bylot Island; 72°52'N, 79°53'W; ca. 30-50 ft. above base of unit T.

*Lycopodiacidites* sp.
*Sphagnum* spp.
*Cingulatisporites* sp.
cf. *Baculatisporites* sp.
Miscellaneous bisaccate conifer pollen
*Glyptostrobus* sp.
cf. *Carpinus* sp.
*Alnus* sp.
cf. *Carya* sp.
*Tricolpites* sp.
*Triporopollenites* spp.
*Tricolporopollenites* sp.

Age: Paleocene or Eocene.

G.S.C. loc. 8442, field no. JDD-121/1-68, southwest Bylot Island; 72°52'N, 79°53'W – same station as G.S.C. C-22459; ca. 30-50 ft. above base of unit T.

*Gleicheniidites senonicus* Ross 1949
*Laevigatosporites* sp.
? *Foveotriletes* sp.
*Osmundacidites wellmanii* Couper 1953
*Sphagnumsporites antiquasporites* (Wilson & Webster) Pocock 1962
*Lycopodiumsporites austroclavatidites* (Cookson) Pocock 1962
*Monosulcites* sp.
cf. *Carpinus*
*Carya* sp.
cf. *Pterocarya* sp.
*Trudopollis* sp.
Bisaccate conifer pollen
Monoporate fungal spores
*Triporites* sp.

Age: preservation poor, diagnostic palynomorphs absent. Suspect it is Senonian (or at least Upper Cretaceous). Appears to be non marine.

G.S.C. loc. C-22458, field no. JDD-120a-68, southwest Bylot Island; 72°47'N, 79°32'W; base of unit T.

*Sphagnum* spp.
*Cingulatisporites* spp.
Taxodiaceae
*Taxodium* sp.
Misscellaneous bisaccate conifer pollen
*Glyptostrobus* sp.
cf. *Metasequoia* sp.
*Alnus* sp.
*Triporopollenites* spp.
*Tricolpites* sp.
? *Extratriporopollenites* sp.
cf. *Salix* sp.
*Carpinus* sp.
cf. *Carya* sp.
*Tricolporopollenites* spp.

Age: Paleocene or Eocene.

#### Unit KT2

G.S.C. loc. C-3227, field no. JDD-120b/2-68, southwest Bylot Island; 72°47'N, 79°32'W; top of unit KT2.

Bisaccate coniferales
? Podocarpaceae
*Liliacidites*
Triporate pollen grains
? *Carya* sp.
? *Salix* sp.
? *Betula* sp.
*Trithyrodinium* sp.
*Palaeostomocystis laevigata* Drugg

Age: "preservation of palynomorphs very poor. Probably Maestrichtian or Paleocene. Marine."

G.S.C. loc. C-3229, field no. JDD-119/1, southwest Bylot Island; 72°45'N, 79°19'W; unit KT2.

*Liliacidites* sp.
*Trudopollis* sp.
? *Carya* sp.

Unidentified triporate pollen grains
*Osmundacidites wellmanii* Couper
? *Alnus* sp.
*Tsugaepollenites mesozoicus* Couper
Few unidentified marine phytoplankton
*Retitricolpites* sp.
cf. *Metasequoia* sp.
cf. Taxodiaceae sp.

Age: "highly uncertain, probably Upper Cretaceous. Probably marine."

G.S.C. loc. C-3230, field no. JDD-119/2, southwest Bylot Island; 72°45'N, 79°19'W – same station as G.S.C. C-3229; unit KT2.

Bisaccate coniferales
Podocarpaceae
? *Betula* sp.
? *Corylus* sp.
? *Pterocarya* sp.
*Carya* sp.
*Alnus* sp.
*Monosulcites* sp.
A few marine phytoplankton
*Classopollis* sp.
*Tricolpites* sp.

Age: "...Senonian, possibly Paleocene. Probably marine."

G.S.C. loc. C-22453, field no. JDC-87/1-68, southwest Bylot Island; 72°52'N, 78°36'W; ca. 150 ft. above base of unit KT2.

*Undulatisporites* sp.
*Sphagnum* spp.
*Lycopodium* sp.
*Neoraistrickia* sp.
*Osmunda* sp.
*Laevigatosporites* sp.
*Cingulatisporites* sp.
cf. Taxodiaceae
Miscellaneous bisaccate conifer pollen
cf. *Metasequoia* sp.
*Glyptostrobus* sp.
*Ephedra* sp.
*Triporopollenites* spp.
*Tricolporopollenites* spp.
cf. *Engelhardha* sp.
*Tricolpites* spp.
cf. *Carga* sp.
cf. *Betula* sp.
*Pterocarya* sp.

Age: "Probably Paleocene, possibly Eocene."

G.S.C. loc. C-22454, field no. JDC-87/2-68, southwest Bylot Island; 72°52'N, 78°36'W – same station as G.S.C. C-22453; ca. 150 ft. above base of unit KT2

*Deltoidospora* sp.
*Lycopodium* sp.
*Sphagnum* spp.
*Osmunda* sp.
cf. *Glyptostrobus* sp.
Miscellaneous bisaccate conifer pollen
*Tricolpites* sp.
*Alnus* sp.

Age: "poorly preserved and inconclusive assemblage, but probably lower Tertiary."

G.S.C. loc. C-22455, field no. JDC-88/1-68, southwest Bylot Island; 72°55'N, 79°03'W; basal part of unit KT2.

cf. *Lycopodium* sp.
*Betula* sp.
cf. *Corylus* sp.
*Triporopollenites* spp.
*Tricolpites* sp.
Miscellaneous bisaccate conifer pollen

Age: "preservation poor and palynomorphs uncommon, but probably this is a Paleocene assemblage."

Unit KT1

G.S.C. loc. C-22465, field no. DA-66/3-63, southwest Bylot Island; south end Aktineq Glacier; 72°53'N, 78°55'W; ca 100-150 ft. below top of unit KT1.

cf. *Taxodium* sp.
Taxodiaceae
Miscellaneous bisaccate conifer pollen
cf. *Ephedra* sp.
cf. *Classopollis* sp.
*Tricolpites* spp.
*Alnus* sp.

Age: probably Paleocene.

G.S.C. loc. C-22466, field no. DA-66/4-63, southwest Bylot Island; south end Aktineq Glacier; 72°53'N, 78°55'W; same station as G.S.C. C-22465; ca. 100-150 ft. below top of unit KT1.

*Sphagnum* spp.
*Deltoidospora* sp.
*Gleichenia* sp.
*Metasequoia* sp.
*Clyptostrobus* sp.
Miscellaneous bisaccate conifer pollen
cf. *Betula* sp.
cf. *Corglus* sp.
*Tricolpites* sp.
*Triporopollenites* spp.

Age: probably Paleocene.

Unit K

G. S. C. loc. 5425, field no. 1-2; Salmon River coal deposit, northern Baffin Island; 7 mi. S.W. from Pond Inlet and ca. 2½ mi. upstream; unit K.

cf. *Osmundacidites* sp.
*Pleuricellaesporites* sp.
*Sphagnum antiquasporites* Wilson and Webster
*Deltoidospora* sp.
*Gleicheniidites* sp.
*Cingulatisporites* sp.
Miscellaneous bisaccate conifer pollen
cf. Taxodiaceae

Age: "indeterminate; the poorly preserved palynomorphs, accompanied by woody fragments, are all found in sediments ranging from Jurassic to Tertiary in age."

G. S. C. loc. C-3235, field no. JDB-177-68; Salmon River coal deposit northern Baffin Island; 72°37'N, 78°06'W – same general location as G. S. C. 5425; composite over 40-50 ft. of a 60-ft. section, unit K.

Bisaccate coniferales
*Gleicheniidites senonicus* Ross
Taxodiaceae
cf. *Tricolpites* sp.

Age: probably Upper Cretaceous, apparently continental.

G. S. C. loc. C-22470, field no. JDM-122/1-68, Salmon River coal deposit northern Baffin Island, 72°37'N, 78°06'W – taken from near top of section represented by G. S. C. C-3235; unit K.

*Cyathidites* sp.
*Sphagnum* spp.
*Lycopodium* sp.
*Baculatisporites* sp.
*Gleichenia* sp.
*Cicatricosisporites* sp.
*Osmunda* sp.
*Tsuga* sp.

Age: assemblage not diagnostic, on basis of what is present and what is absent, a Lower Cretaceous age is suggested.

G. S. C. loc. 3233, field no. JD-212-68, Salmon River coal deposit, northern Baffin Island; 72°37'N, 78°06'W – taken from near top of section represented by G. S. C. C-3235; unit K.

*Cicatricosisporites mohrioides* Del & Sprum
*C. australiensis* (Cookson) Potonie
*C. hallei* Del & Sprum
*Cicatricosisporites* sp.
*Gleicheniidites senonicus* Ross
*Lycopodiumsporites* sp.
*Cyathidites minor* Couper
*Osmundacidites* cf. *wellmanii* Couper
*Deltoidospora* sp.
*Sphagnumsporites antiquasporites* (Wilson & Webster) Pocock
*Deltoidospora juncta* (Kara-Murza) Singh
*Laevigatosporites* sp.
*Schizaeoisporites* cf. *eocenicus* (selling) Potonie
Cingulate trilete
*Tsugaepollenites mesozoicus* Couper
Bisaccate coniferales
? *Cedrus* sp.
Podocarpaceae
Monocolpate pollen grain
*Pilosisporites sp.*

Age: Lower Cretaceous, probably Neocomian. Probably represents non-marine swamp environment.

G. S. C. loc. C-3234, field no. JDB-176-68, Salmon River coal deposit northern Baffin Island, 72°37'N, 78°06'W – taken from 15 ft. section ca. 2000 ft. north of G. S. C. C-3235; unit K.

Bisaccate coniferales

Age: Indeterminate.

G. S. C. loc. C-3232, field no. JDM-119/1-68, northern Baffin Island, 72°30'N, 78°26'W; unit K.

Bisaccate coniferales
*Deltoidospora* sp.
*Gleicheniidites* sp.
? *Tsugapollenites* sp.

Age: uncertain, probably Cretaceous. Residue largely woody fragments. Apparently non marine.

G. S. C. loc. 5427, field no 3-4, northern Baffin Island; Anglican Mission Mine, ca. 3 mi. inland and 15 mi. southwest down coast from Pond Inlet; unit K.

*Deltoidospora* sp.
*Lycopodiumsporites* sp.
*Gleicheniidites* sp.
*Tsugaepollenites* sp.
cf. Taxodiaceae
Miscellaneous bisaccate conifer pollen

Age: "indeterminate; the poorly preserved palynomorphs, accompanied by woody fragments, are all found in sediments ranging from Jurassic to Tertiary in age."

General Notes;

1) "Preservation of palynomorphs is generally poor"... those from G. S. C. .... "C-3233 are relatively better preserved.

2) The number of palynomorphs is low, both in number of species and number of individuals.

3) "Conifer pollen is extremely rare" ....